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One hundred and ninety-five presents were announced as having been received since the last meeting, including, amongst others:—

American Nautical Almanac Papers (Newcomb, Tables of the Sun and *Mercury*; Hill, Tables of *Jupiter* and *Saturn*), presented by the American Nautical Almanac Office; Aratus, Astronomy and Meteorology, translation of, presented by C. L. Prince; Sir R. S. Ball, Great Astronomers, presented by the publishers; J. Bossert, Catalogue des mouvements propres d'étoiles, presented by the author; Cape Catalogue of 1,713 Stars, presented by the Observatory; A. Cayley, Collected Mathematical Papers, vol. viii., presented by the author; Cincinnati Observatory Publications, No. 13 (Porter, catalogue of 2,000 stars), presented by the Observatory; A. M. Clerke, The Herschels and Modern Astronomy, presented by the author; Greenwich Observations, &c., 1892, presented by the Royal Observatory; Nice Observatoire, Annales, tomes iv., v., presented by M. Bischoffsheim; J. A. C. Oudemans, Triangulation von Java, presented by Professor Oudemans; W. F. Stanley, Notes on the Nebular Theory, presented by the author; Photograph of part of Milky Way, presented by Dr. Sheldon; Photographs of Hammerfest and Vadsö, presented by T. R. Clapham.

Reproduction of Astronomical Photographs.

In continuation of the note in the June number of the *Monthly Notices*, a further list of photographs now on sale to Fellows is given below.

Lantern slides can now also be obtained of any of these, and of those included in the former list.

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R.A.S. Reference No.	Subject.	Photograph by
13	Comet *c* 1893 IV. (Brooks), 1893 October 22	E. E. Barnard
14	Comet *c* 1893 IV. (Brooks), 1893 October 20	E. E. Barnard
15	Comet *c* 1893 IV. (Brooks), 1893 November 10	E. E. Barnard
16	Comet *a* 1892 I. (Swift), 1892 April 26	E. E. Barnard
17	Comet *f* 1892 III. (Holmes), 1892 November 10	E. E. Barnard
18	Comet *a* 1892 I. (Swift), 1892 April 18	E. E. Barnard
19	Portion of Moon (Alps, Apennines, &c.)	MM. Lœwy and Puiseux

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Note on the Value of the Longitude in the Lunar Theory when the Sun's Mass is put Zero. By P. H. Cowell, B.A., Fellow of Trinity College, and Isaac Newton, Student in the University of Cambridge.

(*Communicated by F. W. Dyson, M.A.*)

About fifteen years ago a paper was published in Silliman's journal* by Mr. Stockwell, in which he called attention to the fact that when the mass of the Sun, and therefore its mean motion, is put equal to zero, Delaunay's expression for the longitude † does not degenerate into the ordinary formula for elliptic motion, but contains terms in which the Sun's eccentricity, and the position of the Sun's apse, and the ratio of the parallaxes enter. Mr. Stockwell argued that there must therefore be "something seriously wrong" with Delaunay's analysis.

Mr. Stockwell's objection has been discussed by M. Gogou.‡ He has shown that when the Sun's mass is zero, and consequently when the Moon's node and apse are fixed, certain operations of Delaunay's may be modified. Some terms with different arguments coalesce, and the accuracy of Delaunay's results is fully established, so far as the terms objected to by Mr. Stockwell are concerned.

M. Gogou's work, which involves a modification of several of Delaunay's operations, is very long and laborious. Moreover it merely verifies Delaunay's terms without explaining the physical (in contradistinction to the analytical) reason why such terms should exist. In this paper the question is treated from a different standpoint; the mean motion of the Sun, instead of being put zero, is made to diminish without limit.

At the beginning of his analysis Delaunay replaced the mass of the Sun m' by $n'^2a'^3$ (his notation is well known, and it is unnecessary to explain the meaning of the symbols that occur in this paper); whereas, more accurately, the relation is

$$\mu + m' = n'^2a'^3,$$

μ being the mass of the Earth. Delaunay's analysis is therefore founded upon the assumption that the Sun's mass is extremely large in comparison with the Earth's. Now, when we suppose n' to be diminished to a very small fraction of its actual value, we must either suppose a' increased or m' diminished. It is inconvenient to suppose a' increased, as it would diminish some of the terms in Delaunay's degenerate expression that we are about to consider, and an explanation of them as they stand is more

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* *American Journal,* vol. xx. 3rd series, 1880.

† *Mémoires de l'Académie des Sciences,* vol. xxix. ch. xi.

‡ *Annales de l'Observatoire de Paris,* vol. xviii. 1885.

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